UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/742,690	12/20/2000	Paul James Davis	C7535(V)	5544

201 7590 09/24/2002

UNILEVER
PATENT DEPARTMENT
45 RIVER ROAD
EDGEWATER, NJ 07020

EXAMINER
RAO, MANJUNATH N

ART UNIT	PAPER NUMBER
1652	

DATE MAILED: 09/24/2002

17

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/742,690	DAVIS ET AL.	
	Examiner	Art Unit	
	Manjunath N Rao	1652	

-- The MAILING DATE of this communication appears n the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 July 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) *15 and 16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 December 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6, 7, 9, 13.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claims 1-16 are still at issue and are present for examination.

Election/Restrictions

Applicant's election with traverse of Group I, Claims 1-14 in Paper No. 15 is acknowledged. The traversal is on the ground(s) that coexamination of all of Groups I-III would not be an undue burden for the Examiner. This is not found persuasive because while the searches for the three groups overlap, they are not coextensive. The search for Groups II and III would each require the search of subclasses unnecessary for the search of elected Group I. For example, search of Group I would require search of subclass 530/350 and search of Group II and III would require search of subclass 510/114 and 435/263 respectively.

The requirement is still deemed proper and is therefore made FINAL.

Claims 15-16 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention, the requirement having been traversed in Paper No. 15. However, Examiner will consider rejoining the above claims when claims of group I are in condition for allowance.

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 4-14 and claims 2-3 which depends from claim 1 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1, 3-14 recite the phrase "high binding affinity". The term "high" is a subjective term. It is not clear to the Examiner as to what extent of binding, applicants consider as "high". A perusal of the specification also does not provide a definition for the above term in terms of a numerical value. Without a specific definition for the above term, the above phrase renders the claim indefinite.

Claims 2-3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 2 and 3 recite the phrase "obtainable from". It is not clear to the Examiner as to what applicants mean by "obtainable". Literally the word means that cellulose binding domain is "obtainable" from those organisms listed in the two claims, not always but under certain conditions only. Therefore, simply amending the claim to recite the word "obtained from" in place of "obtainable from" would overcome this rejection.

Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 12 recites the phrase "preferably 2-5 amino acids". The scope of the term "preferably" is not clear to the Examiner. Simply deleting the term "preferably" would overcome this rejection.

Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 14 recites the phrase "an analogous structure". It is not clear to the Examiner as to what applicants mean by the above phrase. A perusal of the specification did not provide any specific definition to the above terms. Without a specific definition to the above phrase, the claim is rendered indefinite.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 6, 14 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a fusion protein comprising a CBD and a domain having a high binding affinity for another ligand such as an antibody, does not reasonably provide enablement for any fusion protein comprising a CBD and a domain having a high binding affinity for another ligand which is analogous to the antibody or the antibody fragment or any fusion protein comprising a CBD and a domain having a high binding affinity for another ligand which is a peptide. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

Factors to be considered in determining whether undue experimentation is required, are summarized in In re Wands (858 F.2d 731, 8 USPQ 2nd 1400 (Fed. Cir. 1988)) as follows: (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the

prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claim(s).

Claims 6 and 14 are so broad as to encompass fusion protein comprising a CBD and anything that remotely even resembles an antibody fragment or any peptide. The scope of the claims is not commensurate with the enablement provided by the disclosure with regard to the extremely large number of amino acid sequences that are broadly encompassed by the claim. Since the amino acid sequence of a protein (in this case an antibody)determines its structural and functional properties, predictability of which changes can be tolerated in a protein's amino acid sequence and obtain the desired activity requires a knowledge of and guidance with regard to which amino acids in the protein's sequence, if any, are tolerant of modification and which are conserved (i.e. expectedly intolerant to modification), and detailed knowledge of the ways in which the proteins' structure relates to its function. Furthermore, as applicants plan to use the fusion proteins in detergents or to treat fabrics, using any peptide in the fusion protein may not provide the same results when compared to fusion proteins comprising CBD and peptides with specific structure and function. However, in this case the disclosure is limited to the fusion protein comprising a CBD linked to an antibody.

While recombinant and mutagenesis techniques are known, it is not routine in the art to screen for multiple substitutions or multiple modifications, as encompassed by the instant claims, and the positions within a protein's sequence where amino acid modifications can be made with a reasonable expectation of success in obtaining the desired activity/utility are limited in any protein and the result of such modifications is unpredictable. In addition, one skilled in the art

would expect any tolerance to modification for a given protein to diminish with each further and additional modification, e.g. multiple substitutions.

The specification does not support the broad scope of the claims which encompass all or any modifications and fragments of any peptides because the specification does not establish: (A) regions of any or all antibody structure which may be modified without effecting its activity; (B) the general tolerance of all or any antibody/ies to modification and extent of such tolerance; (C) a rational and predictable scheme for modifying any residue with an expectation of obtaining the desired biological function; (D) in the case of peptides, the specification does not teach that the fusion protein comprising the CBD and any or all peptides will have the desired function, and (E) the specification provides insufficient guidance as to which of the essentially infinite possible choices is likely to be successful.

Thus, applicants have not provided sufficient guidance to enable one of ordinary skill in the art to make and use the claimed invention in a manner reasonably correlated with the scope of the claims broadly including any or all structures or peptides with an enormous number of amino acid modifications. The scope of the claims must bear a reasonable correlation with the scope of enablement (In re Fisher, 166 USPQ 19 24 (CCPA 1970)). Without sufficient guidance, determination of fusion proteins having the desired biological characteristics is unpredictable and the experimentation left to those skilled in the art is unnecessarily, and improperly, extensive and undue. See In re Wands 858 F.2d 731, 8 USPQ2nd 1400 (Fed. Cir, 1988).

Claims 6 and 14 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 6 and 14 are directed to fusion proteins comprising CBD and structures analogous to antibodies or any peptide. Claims 6 and 14 are rejected under this section of 35 USC 112 because the claims are directed to a genus of polypeptides including modified polypeptide sequences, modified by at least one of deletion, addition, insertion and substitution and fragments that have not been disclosed in the specification. No description has been provided of the modified polypeptide sequences encompassed by the claim. No information, has been provided by applicants which would indicate that they had possession of the claimed genus of modified polypeptides. The specification does not contain any disclosure of the structure and function of all the peptide sequences in the fusion protein (apart from the CBD sequences) including fragments and variants within the scope of the claimed genus. The genus of polypeptides claimed is a large variable genus including peptides which can have a wide variety of structure and function. Therefore many structurally and functionally unrelated polypeptides are encompassed within the scope of these claims. The specification discloses only a single species of the claimed genus which is insufficient to put one of skill in the art in possession of the attributes and features of all species within the claimed genus. Therefore, one skilled in the art cannot reasonably conclude that applicant had possession of the claimed invention at the time the instant application was filed.

Applicant is referred to the revised guidelines concerning compliance with the written description requirement of U.S.C. 112, first paragraph, published in the Official Gazette and also available at www.uspto.gov.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4, 6, 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Shoseyov et al. (US 5,719,044, 2-17-1998). This rejection is based upon the public availability of a printed publication or that the invention was already patented. Claims 1-2, 4, 6, 14 of the instant application are drawn to a fusion protein comprising CBD and a domain having a high binding domain for another ligand (claim 1), wherein the CBD is obtained from Clostridium (claim 2), wherein the high binding domain is an antibody or a antibody fragment (claim 4) or a peptide (claim 6) or a multispecific antibody or antibody fragment or an analogous structure (claim 14). Shoseyov et al. disclose an identical fusion protein comprising a CBD obtained from Clostridium wherein the high binding domain is an antibody or a antibody fragment or a peptide or a multispecific antibody or antibody fragment or an analogous structure . Thus Shoseyov et al. anticipate claims 1-2, 4, 6, 14 of this application as written.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-3, 6 12 are rejected under 35 U.S.C. 102(a) as being anticipated by Bettiol et al. (WO 99/57155, Nov. 1999). This rejection is based upon the public availability of a printed

publication. Claims 1-3, 6, 12 of the instant application is drawn to a fusion protein comprising CBD and a domain having a high binding domain for another ligand (claim 1), wherein the CBD is obtained from Trichoderma (claim 2), such as *T.reesei* (claim 3)and wherein the high affinity domain is a peptide (claim 6) and wherein both the domains n the fusion protein are linked by an amino acid linker consisting of 2-15 or 2-5 amino acids (claim 12). Bettiol et al. disclose an identical fusion comprising a CBD and an antimicrobial peptide wherein the CBD is obtained from T.reesei and both the domains are linked through an amino acid linker region (see page 19). Thus Bettiol et al. anticipate claims 1-3, 6 and 12 of this application as written.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shoseyov et al. as applied to claims 1-2, 4, 6, 14 above, Bettiol et al. as applied to claim 1-3, 6 and 12 above and further in view of Hauwermeiren et al., (WO 98/06812, 2-19-1998), Frenken et al. (WO 94/25591, 10-11-1994) and the common knowledge in the art of laundry detergents. Claims 1-14 of this application are drawn to a fusion protein comprising CBD and a domain having a high binding domain for another ligand (claim 1), wherein the CBD is obtained from Clostridium (claim 2) or T.reesei (claim 3), wherein the high binding domain is an antibody or a antibody fragment (claim 4) such as a Heavy Chain antibody as found in Camelidae (claim 5) or a peptide

(claim 6) or a multispecific antibody or antibody fragment or an analogous structure (claim 14), wherein the domain having a high binding affinity is directed to a "benefit agent" (claim 7) selected from a group as in claim 8, or at the fabric (claim 9) or at polyester etc. (claim 10) or at a specific part of a fabric (claim 11) or at microparticles loaded with a benefit agent (claim 13), wherein the CBD is connected to the other domain by an amino acid linker of 2-15 or 2-5 amino acids (claim 12).

On the whole it appears that fusion proteins comprising CBDs were well known in the art of detergent compositions. Similarly, the technique of using enzymes, antibodies or antibody fragments as part of detergent compositions also appears to be well known in the art of detergent composition, even though the use of them as fusion proteins with a CBD was less known.

The reference of Shoseyov et al. as it applies to claims 1-2, 4, 6, 14 has already been discussed above. However, the reference does not teach that fusion proteins comprising the CBD and an antibody can be used in a detergent composition or that the high binding domain can be directed to benefit agents used in detergents or that the two domains can be linked by an amino acid linker.

Bettiol et al. reference also has been discussed as it applies to claims 1-3, 6 and 12 above. While this reference clearly teaches fusion proteins comprising a CBD and a peptide linked through an amino acid linker and method of making such fusion proteins and their use in detergent compositions, the reference of does not teach the use of antibodies in the fusion protein.

Hauwermeiren et al. teach the use of antibodies to control enzymatic activities in detergent compositions. However, the reference does not teach the use of those antibodies as fusion proteins comprising a CBD.

Frenken et al. teach in general, production of antibodies or functionalized fragments derived from heavy chains of Camelidae.

With all the above reference in hand it would have been simply obvious to one of ordinary skill in the art to combine the teachings of the above references and arrive at the invention claimed in claims 1-14. As stated earlier, Shoseyov et al. teach a fusion protein comprising a CBD and an antibody. Using the reference of Frenken et al. which teaches the advantages of Camilae antibodies and its large scale production, it would have been obvious to one of skill in the art to use the method taught by the reference and make any antibody of interest to use it in the fusion protein. Bettiol et al. teaches a fusion protein comprising a CBD and a peptide and also teaches the advantages of such fusion proteins in detergent compositions. Hauwermeiren et al. teach the use of antibodies to control the action of enzymes used in the detergent compositions. It would have been obvious to one of ordinary skill in the art to make fusion proteins comprising the antibodies of Hauwermeiren et al. fused to the CBD using the procedures taught by Bettiol et al. (through the use of amino acid linker). One of ordinary skill in the art would have been motivated to do so as CBD can bind to the target region on the fabrics (cellulose fibers) and direct the action of either the peptide or the antibody fused to it, on the mark where it is needed. One of ordinary skill in the art would have had a reasonable expectation of success as all the references teach the methods of making and the method of use of fusion proteins comprising a CBD and a peptide or antibody.

Therefore, the above invention would have been *prima facie* obvious to one of ordinary skill in the art.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Conclusion

None of the claims are in condition for allowance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manjunath N. Rao whose telephone number is 703-306-5681. The examiner can normally be reached on 7.30 a.m. to 4.00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ponnathapura Achutamurthy can be reached on 703-308-3804. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-4242 for regular communications and 703-308-4242 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0196.

Manjunath N. Rao, Ph.D.
September 23, 2002

MANJUNATH RAO
PATENT EXAMINER